

WHAT IS CLAIMED IS:

1. An oxygen sensor abnormality detecting device, the device being connectable to the oxygen sensor through a ground line and an output line for detecting an abnormality of the oxygen sensor on the basis of a voltage applied thereto via the output line, the device comprising:

first offset voltage applying means for applying a first offset voltage to the ground line; and

second offset voltage applying means for applying a second offset voltage to the output line via a resistor, the second offset voltage being set to be outside a normal output range of the oxygen sensor.

2. The abnormality detecting device as in claim 1, wherein the first offset voltage is set to be higher than the normal output voltage range of the oxygen sensor.

3. The abnormality detecting device as in claim 1, wherein the predetermined resistor is a pull-down resistor.

4. The abnormality detecting device as in claim 3, wherein a resistance of the pull-down resistor is set to be higher than an internal resistance of the oxygen sensor under an inactive condition.

5. The abnormality detecting device as in claim 1, wherein the second offset voltage is set to be lower than the first offset

voltage.

6. The abnormality detecting device as in claim 5, wherein the second offset voltage is set to be higher than a low voltage-side shorting determination value for determining a low voltage-side shorting.

7. The abnormality detecting device as in claim 1, wherein the second offset voltage is set to be higher than an output voltage range of the oxygen sensor under a normal operation condition.

8. The abnormality detecting as in claim 7, wherein the second offset voltage is set to be lower than a high voltage-side shorting determination value for determining a high voltage-side shorting.

9. The abnormality detecting device as in claim 1, wherein at least one of the first offset voltage and the second offset voltage is set by voltage dividing resistors.

10. The abnormality detecting device as in claim 1, wherein the first offset voltage is outputted via an operational amplifier.

11. The abnormality detecting device as in claim 1, further comprising:

a processing unit for receiving an output voltage of the oxygen sensor and the first offset voltage and detecting an abnormality of the oxygen sensor based on a difference between the output voltage and the first offset voltage.

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12. The abnormality detecting device as in claim 1, further comprising:

10 a processing unit for performing an oxygen sensor abnormality detection operation immediately after a start of an oxygen concentration detecting operation of the oxygen sensor.

13. The abnormality detecting device as in claim 1, further comprising:

15 an A/D converter connected to the output line for converting a voltage signal inputted via the output line into a digital signal; and

20 a microcomputer for detecting an abnormality of the oxygen sensor by comparing the digital signal outputted by the A/D converter with two different shorting determination values and a break determination value.

14. The abnormality detecting device as in claim 1, further comprising:

25 an A/D converter for directly receiving a voltage signal outputted by the oxygen sensor and converting the inputted voltage signal into a digital signal; and

a microcomputer for detecting an abnormality of the oxygen sensor based on the digital signal outputted by the A/D converter.

5        15.        An oxygen sensor abnormality detecting device, the device being connectable to the oxygen sensor through a ground line and an output line for detecting an abnormality of the oxygen sensor on the basis of a voltage applied thereto via the output line, the device comprising:

10                offset voltage applying means for applying an offset voltage to the output line through a resistor; and

                 processing means for processing an abnormality determining operation by comparing an output voltage applied through the output line with a high voltage-side shorting determination value,

15                wherein the offset voltage is set to be lower than the high voltage-side shorting determination value.

20        16.        The abnormality detecting device as in claim 15, wherein the resistor has a resistance higher than an internal resistance of the oxygen sensor exhibited when the oxygen sensor is in an inactive condition.

25        17.        The abnormality detecting device as in claim 15, wherein the offset voltage is set to be outside a normal output voltage range of the oxygen sensor.